EPS-HEP99
Abstract # 000
Parallel sessions: 7
Plenary sessions: 7,8

A Search for Squarks of R-Parity Violating SUSY at HERA

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A search for squarks of R-parity violating supersymmetry is performed in ep collisions at HERA using H1 1994→1997 data corresponding to an integrated luminosity of 37pb^{-1}. Direct single production of squarks of each generation by e^+-quark fusion via a Yukawa coupling λ' is considered and various possible R-parity violating decays and gauge decays of the squarks are taken into account. Such couplings could lead in particular to leptoquark-like final states or to explicit manifestation of lepton number violation. The sensitivity to λ' is shown to be only weakly dependent on the free parameters of the Minimal Supersymmetric Standard Model and the reach in the mass-coupling plane extends to domains unexplored in other direct or indirect searches. For a Yukawa coupling of the electromagnetic strength squark masses up to 262 GeV can be excluded at the 95% confidence level; this sensitivity reaches still 175 GeV for a 100 times smaller coupling strength. Squarks coupling to both $e - q$ and $\tau - q'$ pairs are also searched for and the absence of signal allows constraints to be set on the Yukawa coupling involving the τ lepton which explore a yet uncovered domain.